299-E28-62 (A6813)

Log Data Report

Borehole Information:

Borehole: 299-E28-62 (A6813)			**Site:** 216-B-9 Crib		
Coordinates (WA State Plane)		**GWL (ft)[1]:** Not Reached		**GWL Date:** N/A[2]	
North	**East**	**Drill Date**	**TOC[3] Elevation**	**Total Depth (ft)**	**Type**
136,841.3 m	573,847.3 m	Oct. 1948	208.5 m	9	unknown

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel Welded	1.9	8.625	8.0	0.3125	0	12

Borehole Notes:

The logging engineer measured the stickup using a steel tape. Calipers were used to measure the casing wall thickness and the outside diameter. The inside diameter is calculated. A reference point survey "X" is located on top of the casing stickup. Zero reference is the top of casing stickup. Top of casing stickup is cut squarely. HWIS[4] is the source of the TOC elevation and coordinates. Total depth (ground level reference) and casing bottom (TOC reference) are reported from information provided in Chamness and Merz (1993). On 03/12/02, the borehole was swabbed, and no contamination was detected.

Logging Equipment Information:

Logging System:	Gamma 2B		**Type:** SGLS (35%)
Calibration Date:	11/01/01	**Calibration Reference:**	GJO-2002-287-TAR
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0
Logging System:	Gamma 1C		**Type:** High Rate Detector
Calibration Date:	02/07/02	**Calibration Reference:**	GJO-2002-309-TAR
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	**1**	**2**			
Date	03/27/02	03/27/02			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	12.0	2.0			
Finish Depth (ft)	2.0	10.0			
Count Time (sec)	100	100			
Live/Real	R	R			
Shield (Y/N)	N/A	N/A			
MSA Interval (ft)	0.5	0.5			
ft/min	N/A	N/A			
Pre-Verification	B0113CAB	B0113CAB			

Log Run	1	2			
Start File	B0114000	B0114021			
Finish File	B0114020	B0114037			
Post-Verification	B0114CAA	B0114CAA			
Depth Return Error (ft)	0	0			
Comments	No fine-gain adjustment.	Repeat section. No fine-gain adjustment.			

High Rate Logging System (HRLS) Log Run Information:

Log Run	1				
Date	05/14/02				
Logging Engineer	Kos				
Start Depth (ft)	12.3				
Finish Depth (ft)	11.0				
Count Time (sec)	300				
Live/Real	L				
Shield (Y/N)	N/A				
MSA Interval (ft)	0.5				
ft/min	N/A				
Pre-Verification	AC016CAB				
Start File	AC017000				
Finish File	AC017003				
Post-Verification	AC017CAA				
Depth Return Error (ft)	0				
Comments	No fine-gain adjustment.				

Logging Operation Notes:

Zero reference is the top of casing for both the SGLS and HRLS. Logging was performed with a centralizer installed on the both the SGLS and HRLS sondes. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT verifier with SN 082, and pre- and post-survey verification measurements were acquired for the HRLS in the ^{137}Cs verifier SN 1013.

The HRLS detector was in the unshielded housing during logging.

Analysis Notes:

Analyst:	Sobczyk	Date:	05/30/02	Reference:	MAC-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day. The verification spectra were all within the control limits. The recorded peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra were within 10 percent of one another at each spectrum's energy line. The recorded peak counts per second for these three photopeaks were lower in the post-run verification as compared to the pre-run verification. The post-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC Supervisor.

HRLS pre-run and post-run verification spectra were collected at the beginning and end of the log run. The spectra were within the acceptance criteria for the field verification of the Gamma 1C logging system (HRLS). The post-run verification spectrum was used to determine the energy calibration for processing the data using APTEC Supervisor.

Log spectra for both the SGLS and HRLS were processed in batch mode using APTEC Supervisor to identify individual energy peaks and to determine count rates. Concentrations were calculated in EXCEL (source file: G2BNov1.xls), using parameters determined from analysis of recent calibration data. Zero reference is the top of the casing. The casing configuration was assumed to be one string of 8-in. casing with a thickness of 0.322 in. to a log depth of 12 ft. A casing thickness of 0.322 in. is the published value for ASTM schedule-40 steel pipe (a commonly used casing material at Hanford). This casing thickness is within the range of measurement error associated with the logging engineer's measurements. A water correction was not needed or applied to the data.

Dead time corrections were required where the SGLS tool was not saturated. A dead time greater than 40 percent was encountered at 12.0-ft log depth, and data from this station may underestimate the ^{137}Cs concentrations. At dead times greater than 40 percent, peak spreading and pulse pile-up effects may result in underestimation of activities. This effect is not entirely corrected by the dead time correction, and the extent of error increases with increasing dead time. Dead time corrections were applied when dead time reached 10.5 percent, which occurred over the interval from 11.0 through 12.0 ft. The HRLS was utilized to obtain data where the SGLS dead time exceeded 40 percent.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation.

Results and Interpretations:

^{137}Cs, detected almost continuously throughout the borehole, was the only man-made radionuclide detected. ^{137}Cs activities exceeded 100 pCi/g at depths below 11.0 ft. The maximum measured ^{137}Cs concentration was about 5,100 pCi/g at 12.3 ft. Above 10.0 ft, ^{137}Cs activities ranged from 0.2 to 2.7 pCi/g.

Apparent ^{40}K activities are less than 15 pCi/g, which probably represents the coarse-grained sediments of the Hanford H1.

The plots of the repeat logs demonstrate good repeatability of the SGLS data for both the man-made and naturally occurring radionuclides.

References:

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNNL-8800, UC-903, Pacific Northwest Laboratory, Richland, Washington.

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[1] GWL – groundwater level
[2] N/A – not applicable
[3] TOC – top of casing
[4] HWIS – Hanford Well Information System

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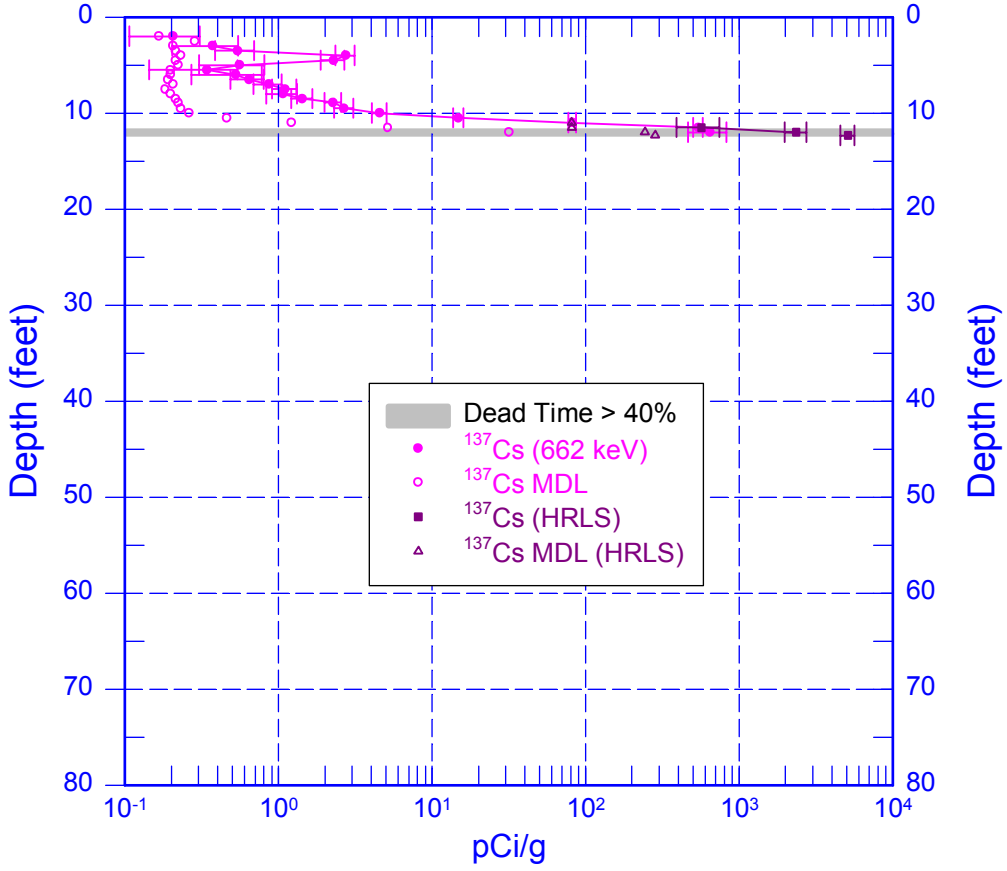
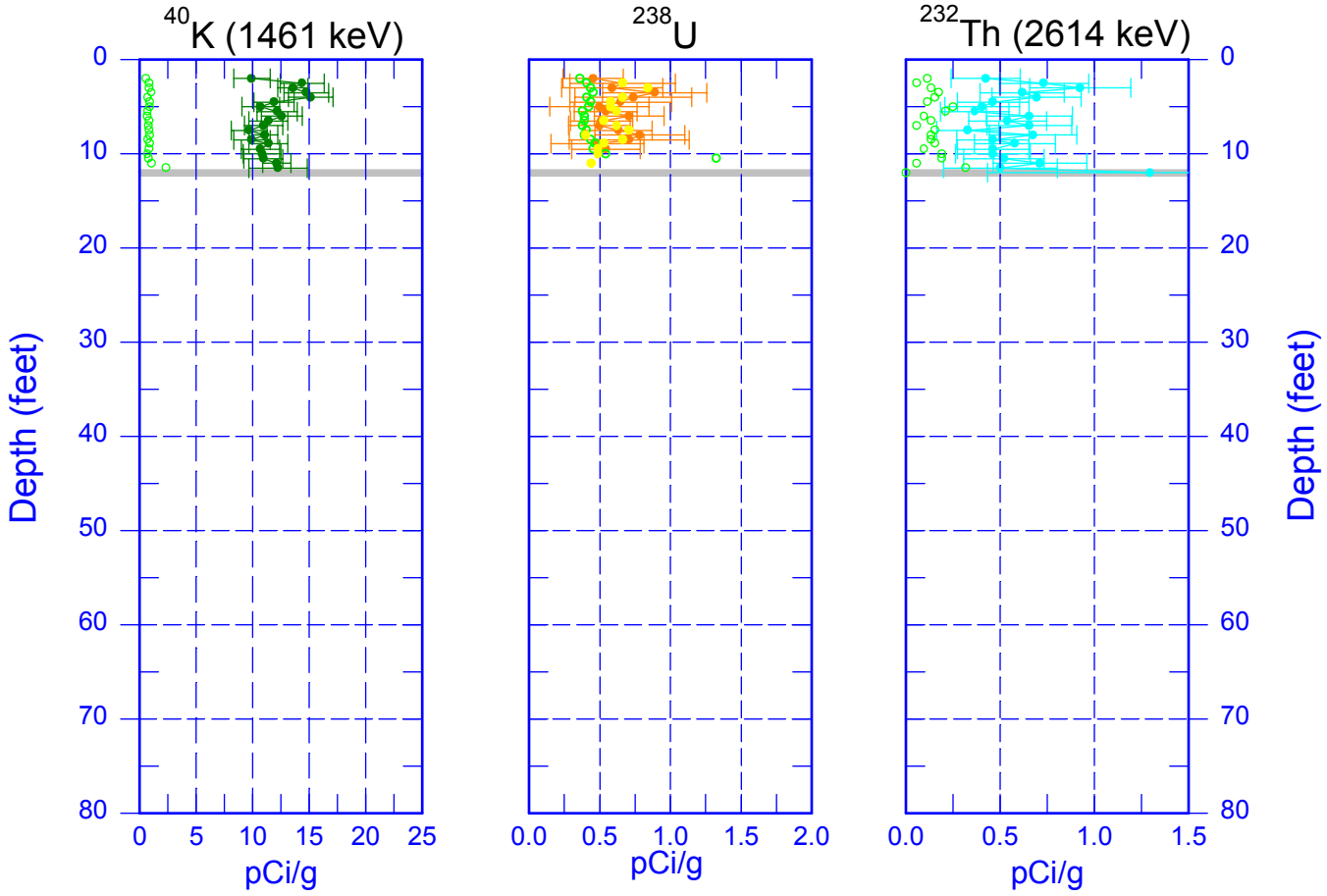
Man-Made Radionuclides



Zero Reference = Top of Casing

Date of Last Logging Run
05/14/2002

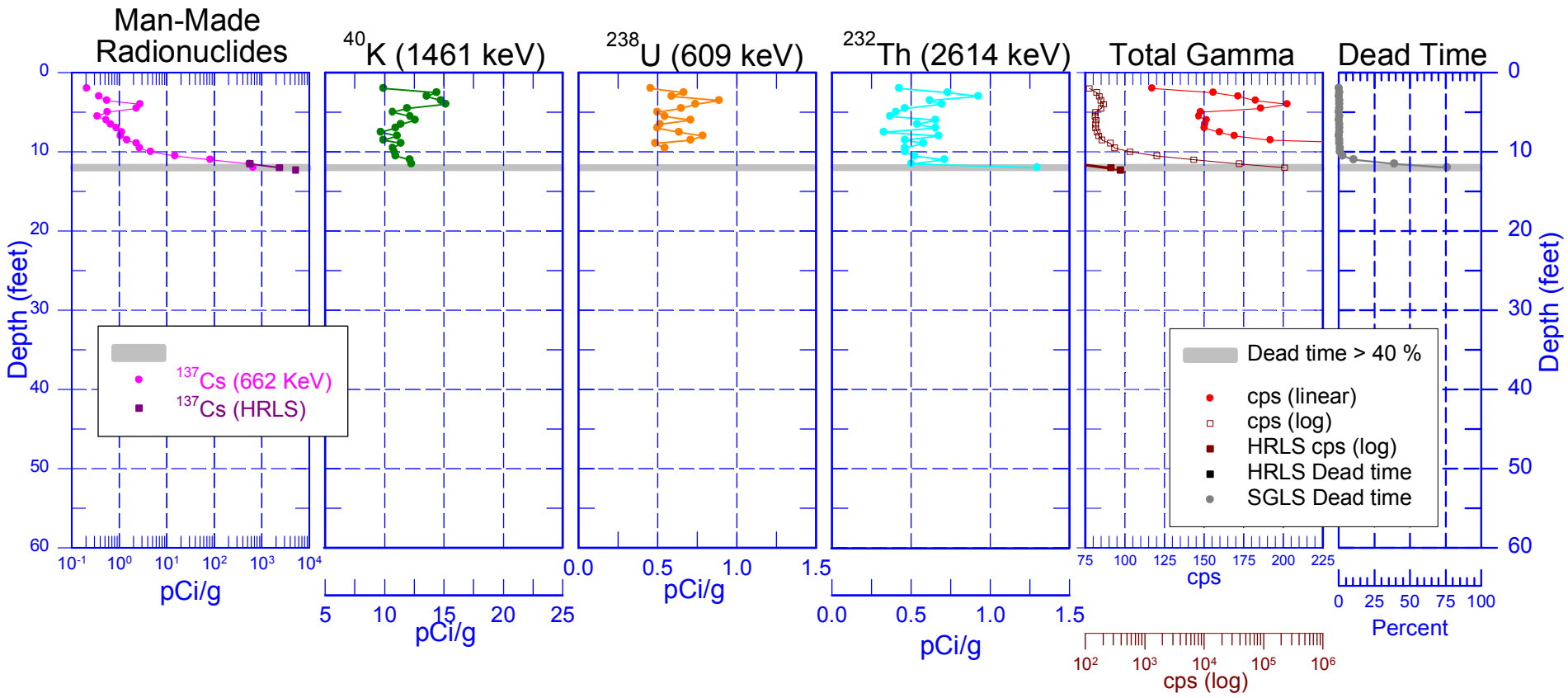
299-E28-62 (A6813)
Natural Gamma Logs



Zero Reference = Top of Casing

Date of Last Logging Run
03/27/2002

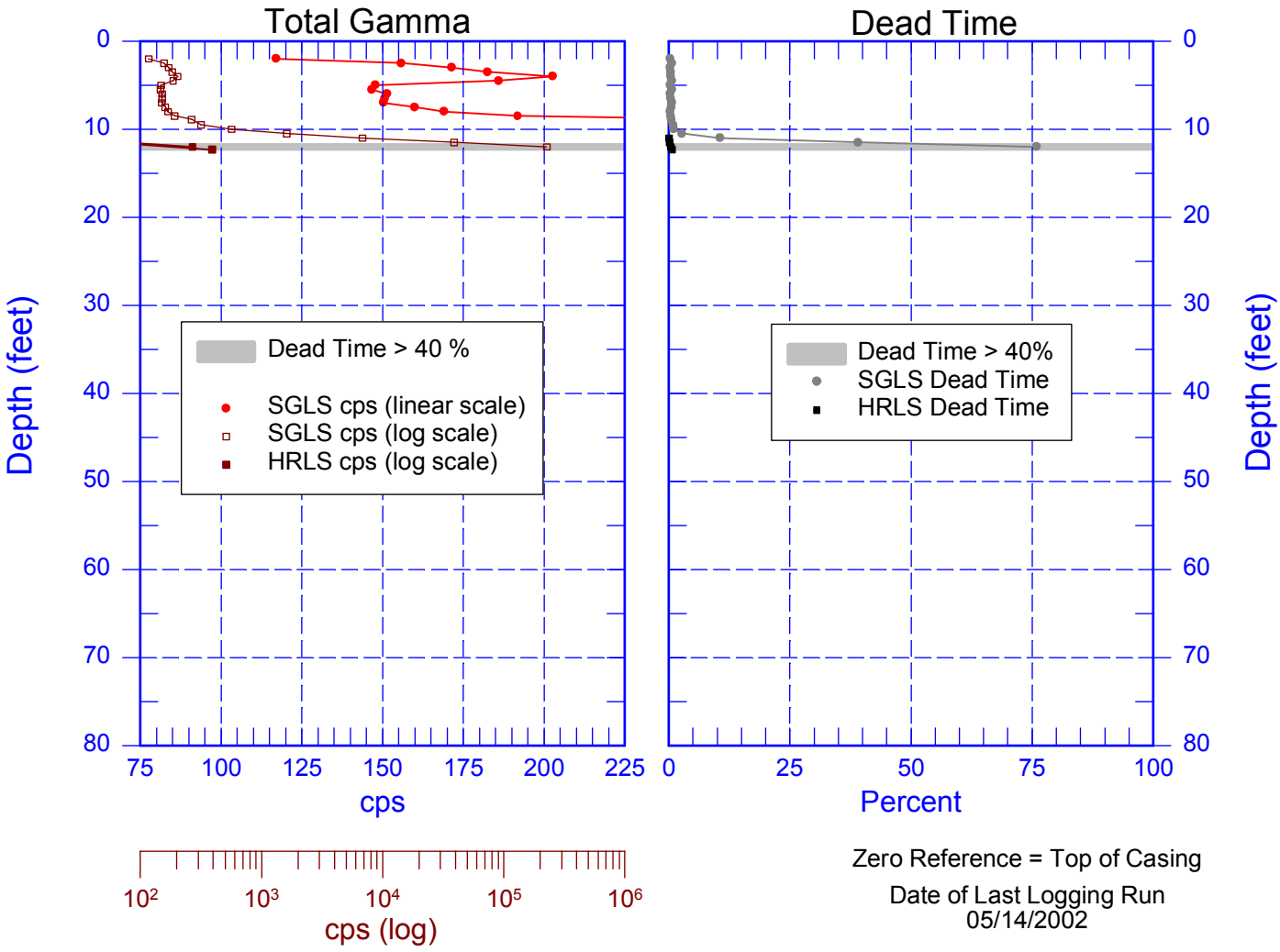
299-E28-62 (A6813) Combination Plot



Zero Reference = Top of Casing

Date of Last Logging Run
05/14/2002

299-E28-62 (A6813)
Total Gamma & Dead Time

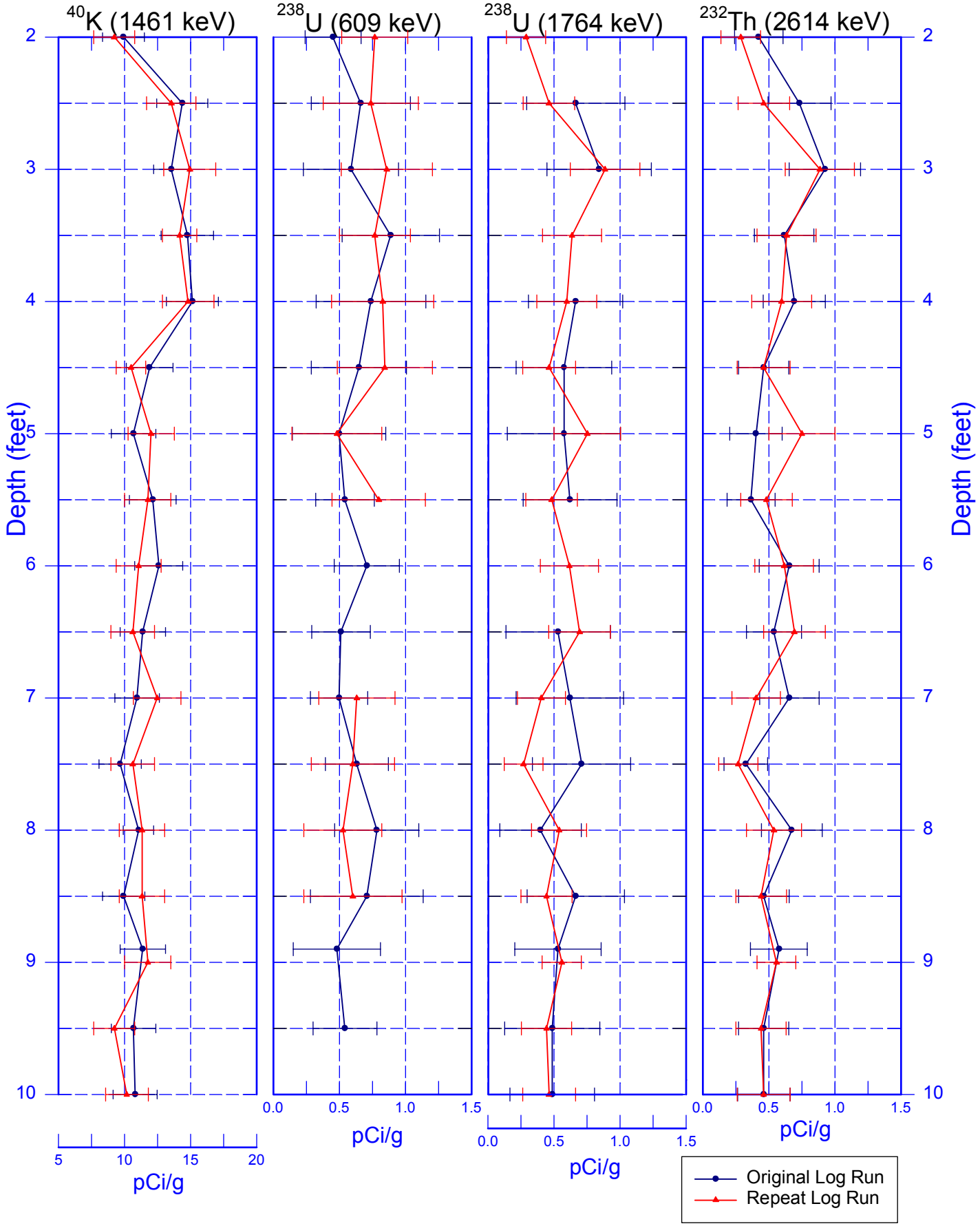


Zero Reference = Top of Casing

Date of Last Logging Run
05/14/2002

299-E28-62 (A6813)

Rerun of Natural Gamma Logs (2 to 10 ft)



299-E28-62 (A6813)

Rerun of Man-Made Radionuclides (2 to 10 ft)